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Utility Model Application

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Applicant: Alcan Aluminiumwerke GmbH, Göttingen-Weende

Title: Piston of light metal with cast-in cooling hose

Alcan Aluminiumwerke GmbH, Göttingen-Weende

Piston of light metal with cast-in cooling hose

The invention relates to pistons of light metal with cast-in cooling hoses, in particular for internal combustion engines. In the case of such pistons, various means are known for conveying the oil out of the crankcase into the cooling hose and back again into the crankcase. The invention relates to the design in which the oil is supplied to the cooling hose arranged in the piston crown through a longitudinal bore in the connecting rod and an annular channel in the bearing surface of the connecting rod small end. In such pistons, the piston pin has an axial bore into which an oil guide sleeve is inserted, the outer wall of which is spaced from the inner wall of the piston pin bore. The piston pin is provided with a plurality of radial bores, of which those arranged in the middle of the piston pin feed the oil from the annular channel in the connecting rod small end over the outer wall of the sleeve and through further radial bores in the vicinity of the one end of the piston pin to an annular channel in the bearing surface of the one piston pin boss, to which the inlet end of the cooling hose is connected. Return of the oil from the cooling hose into the crankcase takes place via an annular channel in the bearing surface of the other piston pin boss and through radial bores provided at the other end of the piston pin.

In the case of such a piston, the bores arranged in the vicinity of the one end of the piston pin, through which the oil is passed via an annular channel into the cooling hose, have to be covered by the bearing surface of the relevant piston pin boss, whereas the bore provided at the other end for return of the oil has to open into the inside of the piston in the vicinity of the bearing surface of the relevant piston pin boss. As a consequence of the different positions of the radial bores in the two end areas of the piston pin, the latter had always to be inserted into the piston in a particular position. If this is overlooked during assembly, circulation of the oil through the cooling hose is hindered or cut off, which may result in serious consequences for operation of the internal combustion engine.

The object of the invention is to ensure, through a novel construction of the piston, that the piston pin may be inserted into the piston in any desired position, i.e. with the one or the other end first, without oil circulation being impaired thereby in any way. This is achieved in that, according to the invention, the sleeve is provided with an eccentrically arranged annular bead, which divides the cylindrical cavity formed between the sleeve and the longitudinal bore in the piston pin into two chambers of unequal length, and in that the bore provided for the return of oil from the shorter chamber into the inside of the piston discharges between the piston pin boss and the connecting rod small end.

Since the connecting rod small end is as a rule of considerable width, according to a further development of the invention the two pin bosses are bevelled at the inner

edges of their bearing surfaces. This makes it possible to arrange the relevant bore in the piston pin somewhat further towards the end thereof. For the same reason, the bore conveying the oil out of the shorter chamber into the crankcase may extend obliquely towards the inside of the piston.

The drawing shows a light metal piston constructed according to the invention in axial section.

The cooling hose 2 is cast into the crown of the piston 1. The piston pin 3 provided with an axial bore is mounted rotatably in the two piston pin bosses 4. An oil guide sleeve 5 is inserted into the axial bore in the piston pin 3, the outer wall of said sleeve being spaced from the inner wall of the piston pin bore except in the portion in which the sleeve 5 rests with an eccentrically arranged bead 6 against the inner wall of the piston pin bore. This bead divides the cylindrical cavity formed between the sleeve 5 and the longitudinal bore in the piston pin into a shorter chamber 7 and a longer chamber 8.

The piston pin with longitudinal bore contains a plurality of radial bores. The bores 9 and 10 arranged in the middle of the piston pin lie opposite the annular channel cut into the bearing surface of the connecting rod small end. The oil therefore passes from the connecting rod through the bores 9 and 10 into the longer annular chamber 8, from there through the radial bores 11 and 12 arranged in the vicinity of the one end of the piston pin 3 and from there into an annular channel 13 in the bearing surface of the one piston pin boss 4. To this annular channel is connected an oil duct leading into the cooling hose 2. From

the cooling hose the oil flows via the annular groove 14 of the other piston pin boss and through the radial bore 15 into the shorter annular chamber 7 of the piston pin. From this chamber, the oil finally returns through the bore 16 into the inside 17 of the piston and thus back into the crankcase. The return bore 16 is arranged in such a way that it discharges between the piston pin boss 4 and the connecting rod small end, not shown in the drawing.

To ensure unhindered return of the oil, even in the case of a wide connecting rod small end, the two pin bosses 4 are bevelled at the inner edges of their bearing surfaces at 18. This makes it possible for the bore 16 to be located as far as possible from the middle of the piston pin. It would also be possible for the bore 16 to extend obliquely towards the inside of the piston 17.

It is readily clear from the Figure that it does not matter, in the above-described embodiment of the piston pin with sleeve inserted therein, with which end the piston pin is inserted first or from which side of the piston. This simplifies assembly significantly and completely eliminates that particular source of error.

Claims

1. A piston of light metal having a cast-in cooling hose and an oil guide sleeve inserted into the axial bore in the piston pin, the outer wall of which sleeve is spaced from the inner wall of the piston pin bore, and having radial bores in the piston pin, of which those arranged in the middle convey the oil from the annular channel in the connecting rod small end over the outer wall of the sleeve through further bores in the one end of the piston pin and through an annular channel in the piston pin boss into the cooling hose, whereupon the oil flows back from the cooling hose into the crankcase via bores provided at the other end of the piston pin, characterised in that the sleeve is provided with an eccentrically arranged annular bead, which divides the cylindrical cavity formed between the sleeve and the longitudinal bore in the piston pin into two chambers of unequal length, and in that the bore provided for the return of oil from the shorter chamber into the inside of the piston discharges between the piston pin boss and the connecting rod small end.

2. A piston according to claim 1, characterised in that the two pin bosses are bevelled at the inner edges of their bearing surfaces.

3. A piston according to claim 1, characterised in that the bore conveying the oil out of the shorter chamber into the crankcase extends obliquely towards the inside of the piston.